

On page 2 of the Action, the drawings were objected to because they allegedly did not mention reference sign "14" in the description. Reference sign or character "14" is mentioned a number of times on page 13, paragraph 37 of the originally-filed specification. While paragraph 37 refers to Figure 3 of the drawing, it is pointed out that Figure 3 is a longitudinal section through the exit window of the apparatus of Figure 1. Thus, since the same part of the invention must have the same reference sign or character, it is submitted that reference character "14" is described and illustrated and thus, no changes to the drawing are necessary.

Claims 1-16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,180,922 to Hug in view of U.S. Patent No. 4,737,624 to Schwarte as explained in paragraph 5 spanning pages 3 and 4 of the Action. This rejection is respectfully traversed.

Applicant's invention is directed to an optoelectronic apparatus that provides the highest possible precision in determining the distance of an object and that provides the most reliable verification of objects in the monitored region (page 4, paragraph 7 of the instant specification). According to Applicant's description of the invention, the claimed optoelectronic apparatus eliminates internal measurement errors that occur in distance measurements of prior art apparatuses. As explained on page 6, paragraph 13 of the originally filed specification, one cause of such measurement errors is that the emission of a transmission light pulse does not occur simultaneously with the actuation of the transmitter due to a trigger pulse or the like. That is, known prior art devices may emit the transmission light pulse with a slight delay due to the finite transit times of the electrical signals in the individual components. Applicant's claimed optoelectronic apparatus provides reliable and the highest possible precision in determining the distance of an object with a transmitter that emits transmission light that is guided into a monitored region, means for coupling out a portion of the light quantity of a transmission light

pulse as a reference transmission light pulse, a receiver that receives reflected light including transmission light pulses reflected by an object in the monitored region and respective reference transmission light pulses which are guided by way of a reference path to the receiver, and an evaluation unit connected to the transmitter and the receiver where the evaluation unit determines transit time t_O of the reflected transmission light pulse and transit time t_R of the respective, reference transmission light pulse and determines the distance of an object by using the transit-time difference $t_O - t_R$. That is, the instant invention employs a single transmitter for realizing both the reference and distance measurements in order to eliminate internal measurement errors that occur in the measurement of distance.

Contrary to the system claimed by the Applicant, Hug is directed to a distance measuring apparatus with phase detection that employs two laser diodes (18, 19), which alternatively direct light via a measurement path (14) and a reference path (15) to a single photoreceiver (20). As the Examiner acknowledges, Hug does not disclose or teach means for coupling out a portion of the light quantity of a **transmission** light pulse as a reference transmission light pulse, as Hug either transmits light from laser diode (18) along a measurement path (14) or directs light from laser diode (19) along a reference path (15). That is, Hug does not "couple out" a portion of the light quantity of a **transmission** light pulse as a reference transmission light pulse, as required by independent claim 1. It is critical in Applicant's invention that the reference transmitting light pulse is assigned to the respective transmitting light pulse from which it was "coupled out" so that the difference $t_O - t_R$ is formed from pulse transit times t_O ; t_R . It is the difference between transit times of a transmission light pulse (t_O) and the respective, reference transmission light pulse (t_R) that determines the distance to an object. As a result, systematic measuring errors

caused by signal transit time fluctuations in electronic components are avoided as explained on page 6, paragraph 13 of the originally filed specification.

Hug discloses two transmitters: 1) transmits a transmission light pulse and 2) directs a reference light pulse) and teaches that the two transmitters are operated complementary, meaning that the pulses are emitted by the transmitters at different times. Accordingly, Hug cannot disclose an evaluation unit that determines a transit time t_O of the reflected transmission light pulse and a transit time t_R of the respective, reference transmission light pulse wherein the transit-time difference $t_O - t_R$ is used to determine the distance of an object. Hug discloses only the distance from a target (13) is determined by measurement of the transit time differences via the measurement path (14) and via the reference path (15). Since Hug does not disclose and in fact teaches against coupling out a portion of a transmission light pulse as a reference transmission light pulse, Hug does not disclose or provide for a respective, reference transmission light that corresponds to a transmission light pulse from which the reference transmission light pulse was "coupled out". As a result, the different evaluation claimed by Applicant in independent claim 1, which determines object distances from the differences $t_O - t_R$ for the transit times of the transmitting light pulses and the respective reference transmitting light pulses, is not possible with Hug.

The secondary reference to Schwarte was applied for its teaching of an optoelectric distance measuring apparatus that includes optical switches (7, 11) and reference light guide (14) to form a reference signal. It is the Action's position that it would have been obvious to one of ordinary skill in the art to modify Hug by eliminating one photodiode to "circumvent any potential problems should the timing of turning on two photodiodes (18-19) simultaneously not be accurate." It is respectfully submitted that there is inadequate motivation to delete one

photodiode from Hug in that Schwarte is concerned with improving an apparatus where a separate lens is provided for the emitting optic and receiving optic and the emitting and receiving optics are located directly at the housing of the appliance (see column 1, lines 35-50). Thus, Schwarte is directed to a different type of distance measurement. Hug teaches phase detection to measure distance and Schwarte does not mention phase detection. Moreover, Schwarte discloses that "about 1%" of the light energy is branched off by an optical coupler 7 on the emitter side into the reference light guide 14. That is, Schwarte teaches diverting about 1% of the light to be transmitted, while Hug discloses directing an entire light beam from another transmitter. Nowhere does Schwarte teach or even remotely suggest that diverting 1% of light energy of a pulse to be transmitted would provide a wavetrain as produced by a transmitter as taught by Hug. Accordingly, it is respectfully submitted that one of ordinary skill in the art would not have considered modifying Hug's distance measuring apparatus by deleting one laser diode because neither Schwarte nor Hug provide support for the alleged motivation.

Further, Schwarte does not disclose an evaluation unit which determines the distance of an object by determining transit time t_0 of a reflected transmission light pulse and subtracting a respective, reference transmission light pulse transit time t_R as required by independent claim 1. As explained in column 4, lines 8-19 of Schwarte, the transmitting light pulses are separated from the reference transmitting light pulses with the aid of a time comparater (17) and are then evaluated individually. That is, the time comparater (17) selects the processing of either the reference signal or the target signal and then processes in succession only reference signals or only target signals in order to form groups of these signals. Accordingly, Schwarte does not provide any disclosure of evaluating the difference in transit time of a transmitting light pulse and any reference transmitting light pulse, let alone the claimed respective or corresponding

reference transmitting light pulse. Consequently, even if Hug was combined with Schwarte, Applicant's claimed invention would not result because neither Hug nor Schwarte disclose, teach or suggest forming the difference between the transit times for the transmitting light pulses emitted by the transmitter and a respective or corresponding reference transmitting light pulse that was coupled-out of the transmitting light pulse. Accordingly, independent claim 1 and its dependent claims 2-16 should be patentable over the prior art of record.

With respect to dependent claims 2 and 3, the Action does not specifically address their inventive features. Accordingly, dependent claims 2 and 3 should be allowable over the prior art of record, at least for the reasons set forth above. In addition, dependent claim 3 recites that for each diversion of a transmission light pulse by the diverting unit, a reference transmission light pulse is coupled-out of the transmission light pulse being guided to the monitored region. Nowhere does Schwarte disclose, teach or even suggest a diverting unit that periodically guides transmission light pulses into the monitored region. Likewise, Hug merely alternates between transmission pulses and reference pulses, and does not couple-out a reference transmission light from a transmission light pulse being guided to the monitored region as required by dependent claim 3. Thus, claim 3 should be patentable over any combination of Hug and Schwarte.

While the Action recognizes that the applied art does not explicitly state the use of an exit window and that Hug does not explicitly state that the coupling means is disposed within the housing, it is the Action's position that "such is well known and would have been mere matter of design choice to one of ordinary skill in the art". It is respectfully submitted that this unsupported, sweeping statement cannot render the claimed invention obvious. Schwarte teaches that optics within a housing provide disadvantages (see column 1, lines 47-57 of Schwarte). Accordingly, it is respectfully submitted that claims 4-7 should be allowable over the

prior art of record at least for the reasons stated above and because of the features recited within each dependent claim.

With respect to dependent claims 8-13, the Action admits that "Hug in view of Schwarte does not explicitly teach the method of quantization of amplitudes of an analog reflection signal" and then states that such is known in the art and would have been a mere matter of obvious design choice. In the absence of a reference teaching the quantizing of the amplitudes of an analog reflection signal appearing at an output of the receiver and the quantized sequence of the reflection signals being read into the individual registers of a memory element at a predetermined rate, it is respectfully submitted that claims 8-13 should be allowable if the prior art of record.

In view of the above, it is respectfully submitted that independent claim 1 and its dependent claims 2-16 are not rendered obvious by any combination of Hug in view of Schwarte. Applicant submits that this application is in condition for allowance and respectfully requests a Notice of Allowability indicating the same.

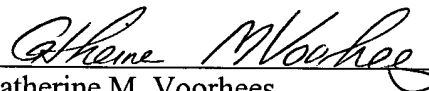
Concurrently filed herewith is a Supplemental Information Disclosure Statement submitting an English translation of pertinent parts of the European Search Report filed October 2, 2002. However, Applicant respectfully submits that 37 CFR §§1.97-1.98 do not require an "English language" version of the Search Report in order for the references submitted in the October 2, 2002, Information Disclosure Statement to be considered. The European Search Report that was submitted with the October 2, 2002, Information Disclosure Statement included a concise explanation of the relevance of each reference cited in that the category "X" or "A" is clearly shown in the non-English language search report. Nowhere does 37 C.F.R. §§ 1.97-1.98

require an English translation of Search Reports as, it is respectfully submitted, the categories "X" and "A" are sufficient to convey that "X" documents are "of special importance by itself" and "A" documents describe technical background". Accordingly, it is believed that the Examiner should have considered Search Report as filed. However, concurrently submitted is the translation of the Search Report as requested in the Action.

Should the Examiner believe a conference would advance the prosecution of this application, he is encouraged to telephone the under side counsel to arrange such an interview.

Respectfully submitted,

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